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METHOD FOR BAKING BAKERY PRODUCTS WITH MICROWAVE OVENS
[Denshi Renji De Bekari Seihin Wo Baishosuru Hoho]

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SPECIFICATION /1*

1. Title

Method for Baking Bakery Products with Microwave Ovens

2. Claims

1. A method for baking bakery products comprising:

a step of placing a minimum of one kind of bakery product in a dough form, which may optionally have been incompletely baked, inside a molded package that is not flat at the upper section, the upper section containing, in a minimum of a part thereof, a substance that can absorb microwave radiation and convert it into heat and having such a shape that the generated heat can be led substantially downward, that is, toward the top of the dough, directly or by reflection and, furthermore, the interior surface of the upper section being separated from the top and side surfaces of the dough by a predetermined minimum distance prior to and during the dough baking-operation cycle, and

a step of placing a minimum of one kind of bakery product thus packaged in a microwave radiation medium and simultaneously baking and browning it.

2. The method for baking bakery products stated in Claim 1, wherein the bakery product to be baked is in a partially baked dough form.

* Numbers in the margin indicate pagination in the foreign text.

3. The method for baking bakery products stated in Claim 1, wherein the upper section of the molded package has a conical shape.

4. The method for baking bakery products stated in Claim 1, wherein the upper section of the molded package has a pyramid shape.

5. The method for baking bakery products stated in Claim 1, wherein the upper section of the molded package has a dome shape.

6. The method for baking bakery products stated in Claim 1, wherein the upper section of the molded package has a prism shape.

7. The method for baking bakery products stated in Claim 1, wherein the microwave radiant energy absorbing substance is contained in the entire upper surface of the molded package. /2

8. The method for baking bakery products stated in Claim 1, wherein each molded package has a minimum of one vent hole.

9. The method for baking bakery products stated in Claim 1, wherein the bakery products are cookies.

10. The method for baking bakery products stated in Claim 1, wherein the bakery product to be baked is in a raw dough form.

11. The method for baking bakery products stated in Claim 1, wherein the lower surface of the package on which the dough is placed contains the microwave absorbing substance at a minimum of a part of the surface.

12. The method for baking bakery products stated in Claim 11, wherein the lower surface of the package on which the dough is placed

contains the microwave absorbing substance throughout the entire surface.

13. The method for baking bakery products stated in Claim 1, wherein the package is not hard and, moreover, is expandable.

14. The method for baking bakery products stated in Claim 1, wherein the dough is placed in the concave region of the lower section of the molded package.

15. The method for baking bakery products stated in Claim 1, wherein there is a plurality of molded packages that are internally connected.

16. A pakage [sic] for baking optionally partially baked dough comprising: a bottom section for supporting the dough and a non-flat upper section that contains a microwave energy absorbing substance in a part thereof, said upper section making contact with the bottom section; having such a shape that the generated heat can be led substantially downward, that is, toward the top of the dough to be baked, directly or by reflection; and, furthermore, having such a size that the dough contained therein does not make contact with the upper section during a substantial portion of the dough baking-operation cycle.

17. The package for baking dough stated in Claim 16, wherein the bottom surface section of the package contains a microwave absorbing substance at a minimum of a part of the bottom surface that supports the dough.

18. The package for baking dough stated in Claim 16, wherein the molded upper section has a conical shape.

19. The package for baking dough stated in Claim 16, wherein the molded upper section has a pyramid shape.

20. The package for baking dough stated in Claim 16, wherein the molded upper section has a dome shape.

21. The package for baking dough stated in Claim 16, wherein the molded upper section has a prism shape.

22. The package for baking dough stated in Claim 16, wherein the bottom surface section and the non-flat upper section are connected.

23. The package for baking dough stated in Claim 16, wherein there are a plurality of bottom surface sections and a plurality of upper sections, each having an overlapped and perforated area for separating each molded region.

24. The package for baking dough stated in Claim 16 that has a minimum of one vent hole.

25. The package for baking dough stated in Claim 16, wherein the upper section of the package is not hard and, moreover, is expandable.

3. Detailed Description of the Invention

[Field of Industrial Application]

The present invention pertains to a package for bakery product use and also pertains to a method for baking unbaked or incompletely baked bakery items inside such a package by utilizing microwave radiant energy. Furthermore, the present invention pertains to a

package for unbaked or incompletely baked bakery items, and, with the use of this package, the present invention intends to make it possible to completely bake the items to be baked inside this package by utilizing microwave radiant energy as the heat source for baking. /3 Further, the present invention intends to make it possible to simultaneously bake the items and brown the surface by utilizing microwave energy as a means for baking and browning.

[Related Art]

A large number of exclusive-use packages have been developed for microwave cooking use. Many of these exclusive-use packages are for cooking frozen foodstuffs and frozen pizzas. These are common instant food products that the consumers can cook quickly and eat. However, no attempt has been made to devise a package for baking, especially for baking cookies and other individually sold bakery products, utilizing microwave radiant energy.

There are various U.S. patents pertaining to packaging for cooking specific food products by microwave cooking. For instance, in U.S. Pat. No. 4,703,148 is disclosed a package for cooking fish, and said package has heating plates at both the upper section and lower section. The objective of this patent is not only to heat fish to the cooking temperature but also to brown the exterior surface of the fish.

U.S. Pat. No. 4,626,641 is another related patent, in which is described a box for baking a pie therein. This box has a flat microwave-absorbing surface that can be heated with microwave radiant

energy. With this hot upper surface, the upper crust surface of the pie can be baked to a golden brown.

In U.S. Pat. No. 4,661,671 is disclosed a food container that has a microwave absorbing upper panel that is heated by the absorption of microwave radiant energy and that heats the food inside the food container with this panel. The heater panel positioned at the upper section of the food container heats mainly the upper region of the food.

In U.S. Pat. No. 4,646,325 is disclosed a food container that can let microwave radiant energy into the container but, inside the container, reflects the energy so as to retain the microwave energy inside the container. The objective of this patent is efficient utilization of the incident microwave radiant energy.

In U.S. Pat. No. 4,640,838 is disclosed a self-opening package. This self-opening package has an opening that is covered with a tape layer. The adhesive on this tape layer absorbs microwave energy. When the adhesive absorbs microwave energy, the bonding strength of the adhesive weakens, and the seal at the opening comes unglued by the internal pressure generated inside the package, thereby opening the package sufficiently.

In U.S. Pat. No. 4,641,005 is disclosed a food container that is partially comprised of a metallized layer that can absorb microwave radiant energy, and this layer heats food and browns the portion of the food that makes contact with it. The reason for utilizing this

metallized layer for browning food is that microwave energy per se cannot brown food.

In U.S. Pat. No. 4,518,651 is disclosed the use of carbon granules in a film so as to absorb microwave radiant energy and thereby to generate heat. This film is comprised of a thermosetting polymer film.

In U.S. Pat. No. 4,196,331 is disclosed a cooking pack that absorbs microwave radiant energy selectively. According to this patent, a microwave energy absorbing substance is selectively arranged inside the pack structure. This cooking pack is intended for cooking various kinds of meat products.

In U.S. Pat. No. 4,590,349 is disclosed a carton that is used in a microwave oven and that is capable of browning the top portion as well as the lower side portion of a food product to impart a crunchy texture to it.

In the technical field of food packaging used for secondary cooking of food in microwave ovens, various types of packages for food production and distribution use have been developed. Besides the patents noted above, many patents in this technical field pertain to packaging for frozen food products. This type of package is typically comprised of a tray having a plurality of compartments. This tray is often a type that absorbs varying amounts of microwave energy at different compartments of the tray. Therefore, different kinds of food products contained in the different compartments of the tray can be /4

heated at different temperature levels. However, there is no disclosure with regard to an exclusive-use package or reusable package for baking cookies with the use of microwave ovens. Cookies and other baked food products require browning during baking, and a microwave baking process has not been employed for producing such food products.

[Problems that the Invention Intends to Solve]

One problem with microwave cooking is that it is difficult to brown food inside a microwave oven. A food item can be heated quite rapidly by microwave heating, and the heat can penetrate throughout the item, but the item thus baked cannot have the same appearance as that of the product prepared with the use of a conventional oven. For bakery products, in addition to being baked and cooked completely, it is important to have a browned appearance. Consumers expect them to be brown. However, the major problem is that, with a microwave oven, a product does not brown any further when baked. Even when the obtained product is baked fully, it does not become brown.

The present invention, firstly, pertains to producing a freshly baked bakery product from shelf-stable dough and, in some cases, to imparting shelf life of several weeks or thereabouts at room temperature to the product. One objective of the present invention is to provide consumers a technique that is effective for quickly and easily preparing freshly baked bakery products, including, but not limited to, cookies, biscuits, croissants, rolls, pastries, and the

like. Another objective is to freshly bake bakery products with the use of a microwave oven and to produce browned bakery products.

[Means for Solving the Problems]

The present invention can solve the aforesaid problems.

The present invention pertains to a package for bakery products. It also pertains to a method for baking, inside such a package, unbaked or incompletely baked bakery items utilizing microwave radiant energy. Furthermore, the present invention pertains to a package for unbaked or incompletely baked bakery items, and, with the use of this package, the present invention intends to make it possible to completely bake, inside this package, the item to be baked by utilizing microwave radiant energy as the heat source for baking. Further, the present invention simultaneously bakes the item and browns its surface by using microwave energy as the means for baking and browning the item.

According to the present invention, the use of a microwave absorbing suspector [sic] material in a specific shape makes it possible to bake and brown unbaked or incompletely baked items. Microwave energy heats this susceptor material, and this heat is further conveyed to the packaged bakery item. The microwave energy susceptor material covers at least a part, typically all, of the package used for unbaked or incompletely baked products. This susceptor material covers all or a part of the upper section of the package and also covers all or a part of the side surface and bottom

surface of the package, and, furthermore, it may be contained in all or a part of the side surface and bottom surface of the package. Since it is desirable for bakery products to have a darker brown color at the lower surface than the other surfaces, the item to be baked and browned may optionally make contact with the lower surface. This lower surface of the package may also contain a microwave susceptor material. The upper and side regions of the bakery product should not make contact with the microwave susceptor material throughout the baking process and browning process. If the microwave susceptor material makes contact with these regions, the bakery product becomes too brown or burnt at the contacting areas.

With the use of the method and package of the present invention, essentially any kind of bakery product can be produced, but the present invention is especially effective for producing cookies. Accordingly, the present invention will be described by mainly referring to the case of applying it to cookies. As noted in the foregoing, however, the present invention is applicable essentially to any kind of bakery product. What is required here is to prepare an unbaked or incompletely baked dough that has shelf stability at room /5 temperature and to devise a microwave susceptible package that yields a browned and baked product when a dough is baked inside it. The package used for baking in the present invention may be a disposable package or reusable package. This type of package typically does not have durability sufficient for washing or repeated use. Therefore, it

is reused for an average of 2 to 6 times and then discarded. The package that has come with the previously bought product can also be used for baking the recently purchased product.

Packaged cookies available at supermarkets that are the type that usually have considerably long shelf life do not have all of the qualities of freshly home-baked cookies. If one desires cookies that are very similar to home-made cookies, one must purchase them from a local bakery. Freshly baked cookies have a specific flavor that is considered highly desirable. Owing to this strong preference to home-made cookies, the number of franchised cookie bakeries is rapidly increasing. These cookie bakeries sell only freshly baked cookies. Accordingly, among some consumers, there is an increasing demand for freshly baked cookies that can be obtained readily or for a way to prepare freshly baked cookies quickly. The present invention is not only for producing freshly baked bakery products but also for meeting the aforesaid demands. The package of the present invention makes it possible for consumers to purchase, at local supermarkets, cookies that can be quickly baked and to prepare warm and tasty home-made cookies within a few minutes, using a conventional microwave oven. Any number of cookies can be baked, and, if only one is needed, dough for one cookie can be baked at that point in time. The other cookies remaining in the box can be baked later. Thus, the consumer can obtain freshly baked cookies any time.

As for the cookies, essentially any cookie can be prepared utilizing the package and production method of the present invention. These can include butter cookies [as transliterated], chocolate chip cookies, oatmeal raisin cookies, cookies containing pecans or other nuts, and so forth, and the present invention is applicable to any cookie that can be baked fresh at ordinary bakery shops. Thus, there is no limit to the type of cookie. Certain types of cookies require longer baking time than other types of cookies, but the present invention can be implemented in any baking process.

A first feature of the present invention is that, with the use of a special package, an unbaked raw dough or incompletely baked dough can be baked using a microwave oven. Furthermore, the package with which an unbaked or incompletely baked dough can be baked may be used as a package in which the dough is sold, or it may be enclosed inside the package in which the dough is sold. In the case in which the packaging for single item use is a package to be used only once for baking, it is usually preferable for this package to be comprised of two sheets of film that has a molded region at a minimum of one side of the film. What is particularly important here is the shape of the upper section that comprises the package for storing a dough and also to provide a space between this molded section and the dough. When the dough is a cookie dough, the package that contains the dough should not be the type that causes the upper and side sections of the cookie to make contact with the package that absorbs microwave radiant energy.

The package may have a flat bottom surface depending on the item to be baked. For cookies, the package has a flat bottom surface in most cases. However, the main surfaces that absorb microwave radiant energy, that is, the upper and side surfaces, must have specific shapes, and these surfaces must be spaced by a given distance from the upper and side surfaces of the dough. The shape of the surface of the upper section that has been found to be effective for baking is a shape that is essentially not flat and is preferably a conical shape, a conical shape whose tip is cut off, a dome shape, and a multi-sided shape close to a dome shape. Among these shapes, a conical shape, a conical shape whose tip is cut off, and a dome shape are highly effective for browning the upper and side surfaces of a cookie when baking it with a /6 microwave oven. For an elongated dough product, a package having such a shape as an elongated prism shape is used. A pyramid shape whose tip is cut off can also be used. One objective here is to maximize the inner surface of the package so as to maximize the package surface that can contain a microwave energy absorbing substance. By doing so, the heating efficiency of the package can be increased.

Another objective is to concentrate the generated heat on the cookie or other item to be baked. This can be achieved by the shape of the package.

The present invention provides a special package that has a non-flat upper surface with a raised surface region and that is intended for baking unbaked or incompletely baked dough by microwave cooking so

as to prepare a fully baked and also browned bakery product. The unbaked or incompletely baked dough in the present invention has shelf stability. Accordingly, it can be stored for a considerably long period at room temperature. The package of the present invention comprises or includes a plurality of specially shaped packages for placing dough pieces while they are baked. This package has a microwave energy absorbing material at a minimum of a part, usually all, of the inner surface of the package. Such a package is produced by various methods depending on whether the package is the disposable or reusable type. For instance, for unbaked or incompletely baked dough, such as cookie dough, the package is a non-flat package and contains a material that absorbs microwave radiant energy to generate heat. The dough is placed in a region that has a shape that always keeps the dough from making contact with any part of the package, excluding the bottom surface. This special package, in most cases, also serves as the package for the dough. The shape of the package for dough use plays an important role for making it possible to brown the dough while it is baked with microwave energy. The upper portion of the package for a bakery product that is non-flat and has a round shape is preferably in a conical shape, a conical shape whose tip is cut off, a dome shape, or a multi-sided shape. For an elongated product, a package having an elongated shape that matches the shape of the product--for example, a prism shape or a pyramid shape whose tip is cut off--is used. In the case of using plastic film as the package,

the plastic film must be one that can endure heat so as not to be deformed by the heat generated at the time of baking the dough.

The plastic film of the package has a microwave absorbing substance on or inside a minimum of a part, usually all, of the surface thereof, and this substance is heated when it absorbs microwave radiant energy, thereby providing heat for baking the dough and also browning the upper and side surfaces of the dough. Each package usually has a vent hole for discharging a part of the steam generated during baking cookies. This vent hole can be provided at any part. It can be formed in any convenient place. If necessary, the microwave energy absorbing substance may be provided on or in all or a part of the package surface underneath the dough. Doing so makes it possible to brown the bottom surface of the dough when it is baked.

In packaging a dough to be baked, the dough is selectively placed on the lower package sheet. If this lower sheet has concave regions formed therein for placing dough pieces, the dough pieces are placed inside these concave regions. If the package is disposable, the second layer, which corresponds to the layer that includes the remainder of the molded packages, overlays the lower first sheet in such a manner that individual molded upper packages are arranged to cover the dough pieces to be baked. These two layers are kept in tight contact by means of an adhesive, mechanically, or with smooth surfaces that are tightly put together. Furthermore, perforation may be formed at the section in which the first and second sheets are layered so that the

dough items to be baked can be separated as necessary from a sheet that contains from 2 to a dozen or more cookies or the like items. In the case of reusing a package of the type that has a microwave energy absorbing section formed at the upper section, this package contains from 2 to 6 sheets of upper molded packages. A dough is sealed on the sheet of the package. One package usually contains 6 to 12 or more /7 dough pieces.

To bake the items, a required number of dough pieces merely needs to be taken out from the package and placed in a microwave oven. If the package is disposable, the package is directly put in a microwave oven. In the case of using a reusable package, one or more dough pieces are typically placed on the bottom sheet of the package, covered with the upper section of the package having a reusable shape [sic], and then put in a microwave oven. Next, the package is placed at the correct position inside the microwave oven, and the microwave oven is kept turned on for a given time required for baking the items. The time is from about 10 seconds to 5 minutes, although it varies depending on various conditions. During this time, microwave energy bakes cookie or other bakery-product dough completely and simultaneously browns the upper and side surfaces thereof. The bottom surface is also browned, especially when a microwave radiant energy susceptor substance is placed in or on a minimum of a part of the bottom surface. Essentially any type of cookie can be cooked utilizing this package. Examples of the cookies here include, but are not

limited to, chocolate chip cookies, butter cookies, oatmeal raisin cookies, and various kinds of cookies containing nuts, fruits, and other related substances. Furthermore, various kinds of bakery products, such as biscuits, rolls, croissants, pastries, and the like, can be baked in the same manner.

According to the present invention, unbaked or incompletely baked dough is packed in a package that makes it possible to bake and brown it with microwave. A dough is shaped into a desired shape for the finished product and packed after it is incompletely baked or without baking it. The dough here may be a dough shaped for essentially any bakery product. However, cookies are preferable products, and the present invention is described by presenting its application mainly to cookies. Examples of the cookies that can be baked utilizing the package of the present invention include, but are not limited to, chocolate chip cookies, raisin oatmeal cookies, butter cookies, and cookies that are filled with various kinds of fruits, cookies that contain nuts, and so forth. For essentially any cookie that can be prepared and sold in a bakery shop, the package of the present invention for preparing home-made cookies can be utilized. It is only necessary to put these cookies in the package of the present invention and to process it by utilizing microwave radiant energy, as noted in the foregoing.

The present inventors discovered that placing a cookie to be baked in a package molded in a special shape makes it possible to bake

and, moreover, brown raw dough or incompletely baked dough using microwave radiant energy. The upper section of the package is given a non-flat shape so as to maximize the package's interior surface that can have a microwave energy absorbing substance (also referred to as susceptor substance) thereon or therein. Accordingly, the package should be devised so as to have a maximum interior surface. Therefore, a package having a non-flat shape is desirable. Furthermore, this package should be able to reflect the generated heat onto the product to be baked.

The package is made from polymer film or a paper product. The package has a substance that absorbs microwave radiant energy and converts it into heat on a minimum of a part of the upper and side surfaces of the package or therein. If the composition of the package does not contain this type of substance, the substance is placed on the interior surface of the package. The bottom surface may also have a microwave radiant energy absorbing substance therein or on a minimum of a part thereof. The heat generated by the microwave radiant energy absorbed by the cookie dough for itself and the heat generated by the microwave radiant energy absorbed through the upper surface of the molded package are both utilized for baking and browning the cookie contained inside the molded package. A preferable shape of the molded package for packing a cookie is a shape that is not flat, and it includes a conical shape, a conical shape whose tip is cut off, a dome

shape, a multi-sided shape, a pyramid shape, and prism shape. Those having other similar shapes can also be utilized. In any case, to prevent the cookie surface from being overbaked or burnt, the cookie /8 should have a given space from the inner and top surfaces of the molded package. Even after the cookie dough expands, there should be a slight space remaining between it and the interior surface of the side and upper sections of the package.

The molded package that contains cookies typically has a two-piece structure. The package may be comprised of a reusable molded upper section. In this case, the lower base section is typically composed of flat plastic or paper, and this upper enclosure section and this base section are placed inside a wrapping in which cookies are sold. The wrapping contains several reusable upper sections, but the number of the upper sections can be smaller than the number of cookies contained therein. Alternatively, each cookie is packed inside a disposable package. In the present specification, both disposable and reusable molded packages will be discussed.

The package may have either a one-piece structure or two-piece structure. Furthermore, one or more cookies may be placed inside a soft and expandable package. This type of package, when heated, expands to such a size that the inner surface of the package does not make contact with the surface of the items to be baked. This can be accomplished by the use of an expandable package that traps the released steam or carbon dioxide gas to a degree that is sufficient to

prevent the upper and side surfaces of the cookie or other item to be baked from making contact with the inner side of the package. In this manner, the surface of the product is protected against burning and so forth. When the package fully expands, it essentially assumes one of the aforesaid non-flat shapes. In the case of using an expandable package, no vent hole is provided in this package, but, only for the case in which the package is subjected to an extremely high pressure, a vent hole for releasing the pressure is provided. For this reason [sic], a soft and expandable package is used. The expandable package typically comes in a bag shape.

Fig. 1 illustrates a molded package having a conical shape. Dough (10) is placed inside the molded package that is composed of a lower base section (11) and an upper section (12). The upper section (12) is molded in a conical shape and is reusable. The upper section (12) and the lower section (11) make an airtight contact at region 13. Section 12 of the molded package has a microwave absorbing substance (9) (refer to Fig. 8) attached to all or a part of the inner surface of section 12. To explain in further concrete terms, a microwave energy absorbing layer is embedded in the material of section 12. A concrete example is a case in which the microwave absorbing substance is attached to the inner surface of the plastic film or paper in the conical region. Section 12 and section 11 are connected at 13 by mechanically fitting them or with the use of a weak adhesive, thereby keeping these two sections in contact. This contact may be formed

simply by placing section 12 on section 11. The vent hole (8) in this case is located at the tip of the cone. Through this vent hole, the moisture and other gases generated during microwave baking are released.

Fig. 2 illustrates a package whose dough-enclosing region has a conical shape without the tip portion. This package can also be used several times. In this concrete example, 12 (a) indicates the top section formed by cutting the tip of the cone (12). That is to say, the side wall of the cone ends at 12 (a). As in the case of the conical package shown in Fig. 1, a microwave absorbing substance is provided on or in a minimum of a part of the inner surface of section 12. This is also for converting microwave energy into heat and baking dough to a golden brown with this heat. The lower section (11) may also have the microwave absorbing substance at a part or all of the lower surface. Employing this configuration makes it possible to brown the lower part of the cookie. The upper section (12) is layered on the lower section (11) at 13. The vent holes are indicated by openings 8. The bottom surface also contains the microwave energy absorbing substance throughout the entire surface.

Fig. 3 illustrates a concrete example in which the molded package that can be used several times is essentially a dome-shaped package. Here, a cookie dough is placed on the lower section (11). The upper section (14) has a dome shape. The upper section (14) and the lower /9

section (11) are connected at 13 mechanically or by adhesion, thereby keeping the two pieces in tight contact. Alternatively, the upper section (14) is simply placed on the lower section (11). As in the other concrete examples, the dome-shaped region (14) has a microwave absorbing substance therein or on a part or all of the inner surface thereof. In this concrete example, the entire lower surface (11) has some type of microwave absorbing substance. This concrete example illustrates a case in which the package has two vent holes (8). However, section 14 can have any desired number of vent holes.

Fig. 4 illustrates a concrete example in which the molded package is essentially a package with a multi-sided shape. This multi-sided package is similar to a dome-shaped one. Here, the bottom section (11) is flat, but the upper section (15) has what is called a multi-sided shape. As in the aforesaid concrete examples, the two film layers are connected at 13 by adhesion or mechanically, thereby keeping the two sheets in tight contact. Alternatively, the upper section (15) is simply placed on the lower section (11). As illustrated in this figure, providing tabs (16 and 16a) to the package as necessary facilitates separation of these sheets when the consumer takes out the cookies after they are baked. In this concrete example, the upper section (15) is formed from a plastic material, and a microwave energy absorbing substance is admixed in this plastic. The upper section also has vent holes (8). The package having this shape is also applicable to various uses, like the other packages described heretofore.

Fig. 5 is a perspective drawing of a molded package in a prism shape. This package is composed of a lower surface section (21), end sections (22 and 23), and side sections (24 and 25). The inner surfaces of the side sections (24 and 25) have a microwave energy absorbing substance on or in the package material. It is preferable for the end sections (22 and 23) to have the microwave energy absorbing substance on or in the package material. Similarly, the lower surface (21) also has the microwave energy absorbing substance on a minimum of a part of the lower surface (26) [sic] or therein. This type of package is utilized for baking such products as rolls, croissants, and pastries. This type of package is suitable for multiple uses. Fig. 6 illustrates a package having a pyramid shape whose tip is cut off. This one has side sections 27, 28, 29, and 30. Part or all of the side sections of this package have a microwave absorbing substance on the inner surface thereof, or this substance is contained inside side sections 27, 28, 29, and 30. The bottom section (21) also has a microwave energy absorbing substance at a minimum of a part of the bottom surface that supports the dough to be baked. The upper surface (31) also contains the microwave energy absorbing substance. This concrete example also illustrates a case of providing vent holes (8) to the side surfaces. This package is also suitable for multiple uses.

Fig. 7 illustrates a top view of a plurality of cookie dough pieces that are packed inside an array of packages having the shape

illustrated in Fig. 3. This figure is for explaining the concept of disposable packaging. Here, joined cookie-dough packages are shown. The dotted lines (17) indicate perforations, which make it possible to separate one or more packed dough pieces from the rest of the packed dough pieces. The upper film (14) and lower film (11) make tight contact at region 13 located between the cookies. In this drawing, one package is separated from the array of packages. In this concrete example, a microwave energy absorbing substance is connected to the top or inside of the surface of the upper layer film (14) and also comprises a part of the lower layer film (11). The upper film may be either expandable or not expandable. The microwave energy absorbing substance may be embedded in these films.

Fig. 8 is a cross-sectional drawing at line 8-8 in Fig. 7. An array of illustrated dough pieces are packed inside packages having the same dome-shape as in Fig. 3. In this drawing, each dough piece /10 (10) is placed on the lower section (11). Section 14 has a microwave energy absorbing substance (9) on all of the inner surface of this section (14) or inside thereof, preferably on the entire surface or inside thereof [sic]. In this concrete example, section 14 contains a microwave energy absorbing substance (9) on the entire inner surface thereof. The packed dough does not make contact with section 14, and it is placed with a sufficient space so that, even when the dough expands during baking, the dough does not make contact with the inner surface (9) of section 14. If the surface (9) of section 14 makes

contact with the dough while the dough is baked, the surface of the cookie could be overheated in some spots and could be overbaked sometimes. In an extreme case, a part of the cookie may be burnt. The lower film layer (11) may also have the microwave absorbing substance embedded in the surface thereof. Here, vent holes (8) are also shown in the side sections of the dome.

Fig. 9 is a cross-sectional drawing of an array of dough pieces, as in Fig. 8, but, in this concrete example, the lower section (11) has concave regions 11 (a) for dough piece use. In this concrete example, the dough is placed inside each concave region 11 (a) that contains a microwave energy absorbing substance 9 (a). Each upper section (14) having a dome-shaped enclosure region is placed on the lower section (11) so as to cover each dough piece with each dome region. Sections 11 and 14 make tight contact at region 13, as in the heretofore described examples. The film surface has a microwave absorbing substance on the surface or inside thereof. In addition, vent holes (8) are also shown in the concrete example.

Fig. 10 is a cross-sectional drawing of an array of cookies in cookie-use molded packages having a multi-sided shape. In this drawing, each molded package has a multi-sided shape, and the lower section (11) has concave regions 11 (a) for placing cookies therein, but the rest is the same as the one illustrated in Fig. 9. These concave regions, if necessary, may contain spacers (18) that are comprised of

a microwave energy absorbing substance. That is to say, these spacers (18) can absorb microwave energy and can be heated.

The carton for the finished product may carry the trademark of the product or an instruction for microwave-baking the dough contained therein. In opening the box, the cookie-dough sheet merely needs to be taken out from the wrapping in the case of using a disposable package. To bake all the dough pieces in the sheet at once, the sheet as a whole is placed inside a microwave oven, and the microwave oven is set according to the instruction shown on the wrapping. It usually takes from 10 seconds to 5 minutes to bake cookies. The exact baking time required is determined by the prebaked degree of the cookies or the settings of the microwave oven. The baking time also varies depending on the type of cookie that is being baked. These factors, however, do not change the fact that the present invention makes it possible to prepare freshly baked cookies in an extremely short period.

What is important in the present invention is that the cookie dough must have been browned upon completion of the baking. The heat generated by the microwave energy that is absorbed by the package brings about this browning. Therefore, it is essential that the dough to be baked is separated from the package's upper and side surfaces that contain the microwave energy absorbing substance. If this distance is too wide, the dough does not brown sufficiently. If the distance is too narrow, the upper surface portion of the baked product could become too brown or burnt. However, for the purpose of

preventing cookies or other bakery products from being overbaked and so forth, it is necessary to maintain a space required for this purpose between the bakery product and package even after they have expanded. Each package must be devised to suit the intended bakery product. In this manner, cookies or other bakery products can receive sufficient heat for baking them completely and browning them without being burnt. The specific distance for cookies or bakery products that have not been baked yet varies depending on the products. Some products expand more readily than other products during baking. Furthermore, the specific distance also varies depending on whether /11 the dough is raw or not or depending on the degree of prebaking. In short, various products almost always require spaces of different sizes inside the enclosed region before baking. The size of each enclosed region varies depending on the product to be baked. The required space can be determined only by conducting experiments. However, at the upper section of the package, a sufficient space must be ensured so that, even after the product is baked and expands, the upper section of the package does not make contact with the upper surface of the product.

One key point of the present invention is that the upper surface of the package is essentially not flat. If the upper section is flat, the dough, when baked, does not brown well. If the upper section is not flat, a wider surface area can be ensured for the microwave absorbing substance, which means that more heat can be generated.

Furthermore, when the upper section is given a non-flat shape, the heat can be reflected and led downward and thus focused on the dough. There are other reasons why giving the upper section a non-flat shape is advantageous. One of these advantages is that this shape ensures a space for the dough to enter even when the dough expands during baking.

The upper section of the package is constructed from a paperboard or plastic film that has a microwave absorbing substance on the inner surface thereof, and, in the case of a plastic film, this substance may be incorporated in the entire film. The “inner surface” herein means the surface that makes contact with the dough [sic]. Thus, the heat generated by microwave energy is led to the interior so as to bake the product. The microwave energy absorbing substance covers all or part of the inner surface. This absorbing substance may be admixed in the package. The size is determined mainly be the product to be baked. The type of the microwave absorbing substance is preferably one that generates heat in the range of from 250 to 600 [sic] while it receives microwave energy. Metals, metal oxides, and carbon layers are capable of generating heat in this temperature range. However, essentially any microwave energy absorbing substance can be used here. Examples of such absorbing substances include zinc oxide, barium titanate, ferrites of barium, zinc, and strontium, and such compounds as silicon carbide, iron carbide, and ferric oxide. As the carrier material, paper or plastic, such as polyester or polypropylene, is used. Of course, other types of materials can also be used. Such a

carrier material is either flexible or rigid. If it is flexible, it is expanded so as to prevent it from making contact with the cookie or other product to be baked.

Similarly, the lower section on which a cookie or bakery product is placed may also have a microwave energy absorbing layer on all or part of the surface thereof. The same kind of substance may be used for this section to set the section to the same temperature. Alternatively, a different kind of substance may be used to set the section to a different temperature.

The following working examples will explain the present invention in further detail, while presenting concrete cases.

Working Example 1

A cookie dough was prepared from the following composition, as expressed in pounds.

Flour	100
Fine ground sugar	20
Brown sugar	26
Shortening	34
High-fructose corn syrup	44
Skim milk powder	4.0
Table salt	1.3
Sodium bicarbonate	1.6
Diammonium phosphate	0.3
Ammonium calcium phosphate	0.15

Pregelatinized starch	6.0
Wheat gluten	5.0
Dried whole egg powder	4.0
Water	16

Water, shortening, high-fructose corn syrup, sugar, table salt, dried whole egg powder, and skim milk powder were mixed, thereby preparing a creamy mixture. Next, into this creamy mixture were blended the other ingredients, thereby forming a dough. The blending was continued until this dough was thoroughly blended. The dough was /12 shaped into individual cookie-sized dough pieces and baked at 450 [sic] for 3 minutes. Each of these partially baked cookies weighed about 14 g and was approximately 45 mm in diameter, approximately 11 mm in height at the center, and approximately 8 mm in height at the periphery. One of these cookies was placed on a flat sheet that had a microwave absorbing susceptor substance on the entire surface thereof. This cookie was covered with a conical package that had a microwave energy absorbing substance on the entire inner surface thereof. The conical package had a 50 mm diameter and 19 mm height, and it also had a 1.5 mm vent hole at the top of the cone. This packed cookie was placed inside a microwave oven, which was then set to high output, and the cookie was baked for 45 seconds. The resultant cookie had a brownish surface and also had a diameter that was somewhat shorter than 50 mm, a height of 16 mm at the center, and a height of 12 mm at

the periphery. This cookie was completely baked and had a home-made cookie texture.

Working Example 2

The procedure of Working Example 1 was repeated, except that 0.5 pound butter, vanilla extract, and 37 pounds of chocolate chips were incorporated in the composition.

After the dough was thoroughly blended, it was shaped into individual cookie-sized dough pieces, which were baked in an oven at 450 [sic] for 6 minutes. Each of these partially baked cookies was approximately 47 mm in diameter, 13 mm in height at the center, and 6 mm in height at the periphery. One of these cookies was baked in the same manner as in Working Example 1. The baked cookie was 49 mm in diameter, 13 mm in height at the center, and 6 mm in height at the periphery.

[Effects of the Invention]

According to the present invention, a shelf-stable dough is baked using a package for bakery product use, utilizing microwave radiant energy, thereby enabling the consumer to prepare a bakery product easily and quickly.

Furthermore, the present invention has the unique effect of making it possible to obtain a freshly-baked and browned bakery product by microwave baking.

4. Brief Explanation of the Drawings

Fig. 1 is a perspective drawing of dough that is placed inside a conical package.

Fig. 2 is a perspective drawing of dough that is placed inside a conical package whose tip is cut off.

Fig. 3 is a perspective drawing of dough that is placed inside a dome-shaped package.

Fig. 4 is a perspective drawing of dough that is placed inside a multi-sided package.

Fig. 5 is a perspective drawing of a package having an elongated shape, which is usually referred to as a prism shape.

Fig. 6 is a perspective drawing of a package having a pyramid shape whose tip is cut off.

Fig. 7 is a drawing illustrating a plurality of dough pieces that are packed inside dome-shaped packages, as viewed from above.

Fig. 8 is a cross-sectional drawing of a plurality of dough pieces shown in Fig. 3 [sic], which are packed inside dome-shaped packages, as viewed along line 8-8 in Fig. 7.

Fig. 9 is a cross-sectional drawing of an array of dough-piece packages that each contain a dough piece in a concave region within the lower film sheet.

Fig. 10 is a cross-sectional drawing of an array of packages containing dough pieces, each package having the multi-sided dome-shape shown in Fig. 4 and having a spacer installed beneath the dough piece.

8: a vent hole

9: a microwave absorbing substance (-containing) layer on the inner surface of 14

10: cookie dough

11: the lower section of the package

11 (a): a concave region

12: the upper section of the package

12 (a): the top section of the package

13: the contacting section of the upper section and lower section

14: the upper section of the package

15: the upper section of the package

16: a lower tab

16 (a): an upper tab

17: perforation

18: spacer

21: the lower section of the package /13

22, 23: the end section of the package

24, 26: the side section of the package

25: the top section of the package

27, 28, 29, 30: the side section of the package

FIG.1

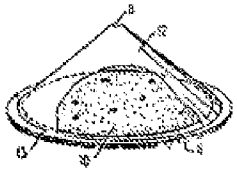

FIG.2

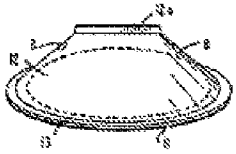

FIG.3

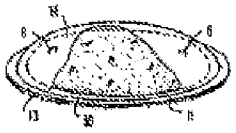

FIG.4

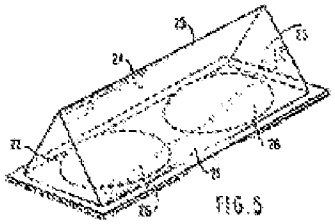

FIG.5

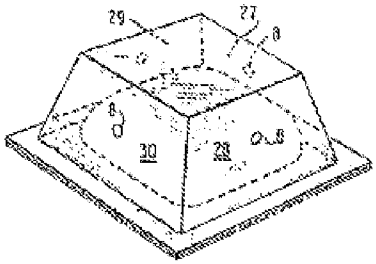

FIG.6

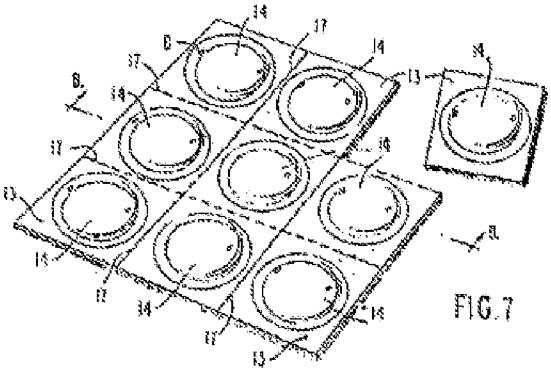

FIG.7

FIG.8

FIG.9

FIG.10